

**Claims**

1. A reversible axial piston machine (1) having a cylinder  
drum (5) which rotates about an axis of rotation (7)  
5 and in the cylinder cutouts of which pistons (6), which  
are supported against an inclined surface (8), are  
movable, the control angle ( $\alpha_1$ ,  $\alpha_2$ ) of said inclined  
surface being adjustable by an adjusting device (12),  
the adjusting device (12) having a control piston (24)  
10 which adjusts the control angle ( $\alpha_1$ ,  $\alpha_2$ ) in both  
pivotal directions and extends with a substantial  
direction component parallel to the direction of the  
axis of rotation (7) of the cylinder drum (5),  
**characterised in that**  
15 the zero position of the inclined surface (8), in which  
the inclined surface (8) is oriented perpendicularly to  
the axis of rotation (7) of the cylinder drum (5), can  
be set without play by a zero-position setting  
device (32).  
20
2. A reversible axial piston machine according to Claim 1,  
**characterised in that**  
the zero-position setting device (32) comprises a first  
adjusting rod (39) which is positionably guided in a  
25 stepped cutout (37) of the control piston (24), said  
cutout extending in the direction of the longitudinal  
axis (11) of the control piston (24), and positions the  
control piston (24) in the two directions of its  
longitudinal axis (11).  
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3. A reversible axial piston machine according to Claim 1  
or 2,

**characterised in that**

the inclined surface (8) is constructed on a rotatably mounted pivot balance (9).

- 5 4. A reversible axial piston machine according to Claim 2,  
**characterised in that**

the control piston (24) is guided in a hollow cylinder (13) which has a first step (14) on its inside and whereof the first opening (15), which is oriented in  
10 the direction of the inclined surface (8), is not closed in order to also enable an axial movement of the control piston (24) outside the hollow cylinder (13), and whereof the second opening (18), which is oriented away from the pivot balance (9), is closed by a closing  
15 cover (19).

5. A reversible axial piston machine according to Claim 4,  
**characterised in that**

the position of the first adjusting rod (39) outside  
20 the adjusting device (12) is set by the first adjusting rod (39) being guided out of the hollow cylinder (13) of the adjusting device (12) by way of the closing cover (19).

- 25 6. A reversible axial piston machine according to Claim 4 or 5,

**characterised in that**

the control piston (24) is positioned in one of the two directions of the longitudinal axis (11) of the control  
30 piston (24) by a respective first and second spring plate (43, 44) which is each fixed on the first adjusting rod (39).

7. A reversible axial piston machine according to Claim 6,  
**characterised in that**

5 the first spring plate (43) is fixed on the first  
adjusting rod (39) in that the first spring plate (43)  
is pressed against the inside end face (46) of a  
closing flange (47) by the spring force of at least one  
pretensioned pressure spring (45) located between the  
first and second spring plate (43, 44), said closing  
10 flange being mounted on that end of the first adjusting  
rod (39) which is located inside the hollow cylinder  
(13) of the adjusting device (12).

8. A reversible axial piston machine according to Claim 7,  
15 **characterised in that**

the second spring plate (44) is fixed on the first  
adjusting rod (39) in that the second spring plate (44)  
is pressed against a sleeve (48) by the spring force of  
the pretensioned pressure spring (45, 45A, 45B), said  
20 sleeve being guided between the second spring  
plate (44) and the closing cover (19) on the adjusting  
rod (39).

9. A reversible axial piston machine according to one of  
25 Claims 6 to 8,

**characterised in that**

the control piston (24) is positioned in the direction  
of the first opening (15) of the hollow cylinder (13)  
in that the first spring plate (43) is pressed against  
30 the end face of a second step (42) of the cutout (37)  
of the control piston (24) as a result of the first

adjusting rod (39) being positioned in the direction of the first opening (15) of the hollow cylinder (13).

10. A reversible axial piston machine according to one of  
5 Claims 6 to 9,

**characterised in that**

the control piston (24) is positioned in the direction  
of the second opening (18) of the hollow cylinder (13)  
in that the second spring plate (44) is pressed  
10 against a snap ring (51) as a result of the first  
adjusting rod (39) being positioned in the direction  
of the second opening (18) of the hollow cylinder  
(13), said snap ring being guided in an annular groove  
along the side face of the cutout (37) of the control  
15 piston (24) in the region of the third opening (38) of  
the cutout (37).

11. A reversible axial piston machine according to one of  
Claims 4 to 10,

20 **characterised in that**

the closing cover (19) has an annular web (20) whereof  
the external diameter corresponds to the internal  
diameter of the hollow cylinder (13) from the second  
opening (18) to the first step (14) of the hollow  
25 cylinder (13), and whereof the internal diameter  
corresponds to the internal diameter of the hollow  
cylinder (13) from the first step (14) to the first  
opening (15) of the hollow cylinder (13).

- 30 12. A reversible axial piston machine according to  
Claim 11,

**characterised in that**

the closing cover (19) is guided in the second opening (18) of the hollow cylinder (13) by means of its tubular web (20) in such a way that a cavity (28, 29) is produced between the hollow cylinder (13),  
5 the closing cover (19) and the control piston (24) and, at the same time, the control piston (24) is mounted on the inner side wall of the annular web (20) of the closing cover (19) and the inner side wall of the hollow cylinder (13) between the first step (14)  
10 and the first opening (15) of the hollow cylinder (13).

13. A reversible axial piston machine according to Claim 12,  
15 **characterised in that**  
the control piston (24) has, on its lateral surface in the region of the cavity (28, 29), a widening (26) which reaches to the inner side wall of the hollow cylinder (13) and divides the cavity (28, 29) into a  
20 first control pressure chamber (28) and a second control pressure chamber (29).

14. A reversible axial piston machine according to Claim 13,  
25 **characterised in that**  
the first and second control pressure chambers (28, 29) are each supplied with a control pressure by way of a respective control pressure opening (31, 33) in the wall of the hollow cylinder (13).

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15. A reversible axial piston machine according to Claim 13 or 14,

**characterised in that**

the two side faces (30, 32) of the widening (26) of the control piston (24) serve as working surfaces for the two control pressures for displacing the control piston (24) in the two directions along the longitudinal axis (11) of the control piston (24).

16. A reversible axial piston machine according to Claim 15,

10 **characterised in that,**

with a defined control pressure, the control piston (24) effects an equal control angle ( $\alpha_1$ ,  $\alpha_2$ ) of the inclined surface (8) in both pivotal directions as a result of the working surfaces of the control piston (24) being of equal size.

17. A reversible axial piston machine according to one of Claims 3 to 16,

**characterised in that,**

20 the control piston (24), which is axially movable in the direction of its longitudinal axis (11), is attached with form fit to the pivot balance (9) by way of a slide block (56) which is mounted in a groove (57) of the control piston (24) and has a cutout in which a journal connected to the pivot balance (9) by way of a connecting arm (58) is fixedly mounted.

18. A reversible axial piston machine according to Claim 7,

30 **characterised in that,**

with an equal excursion of the control piston (24) in one of the two directions along the longitudinal axis (11) of the control piston (24), the pressure spring (45, 45A, 45B), which is fixed in the cutout (37) of the control piston (24) on the first adjusting rod (39), generates an equal restoring force for both directions of the excursion as a result of a defined control pressure.

- 10 19. A reversible axial piston machine according to Claim 4,  
**characterised in that,**  
the axial excursion of the control piston (24) along the longitudinal axis (11) of the control piston (24)  
15 is adjustably delimited by way of a second adjusting rod (52), which is guided out of the hollow cylinder (13) of the adjusting device (12) by way of the closing cover (19).